REMARKS

This amendment is submitted in response to the Office Action dated January 29, 2007. Reconsideration and allowance of claims is respectfully requested. In the office action, claims 1-16 are rejected under 35 USC §101 as directed to non-statutory subject matter. The claims have been amended in a manner consistent with current practice to eliminate this issue.

Claims 1-18 and 22-25 are rejected under 35 USC §103(a) as unpatentable over Guttag (US 6,173,394) in view of Lueh (US 6,966,057). Claim 19-21 are further rejected under 35 USC §103(a) as unpatentable over Guttag and Lueh in further view of Gossett (US 6,236,413). These rejections are respectfully traversed.

Applicant herein teaches and claims a method and apparatus for processing a divergent group of related graphic samples in a programmable graphics pipeline. The pipeline is configured for each processing cycle by a codeword which configures computation units within the pipeline to perform the same operation on multiple ones of the divergent samples. This is achieved by tracking the subroutine depth of each sample in the group of samples, determining the samples which have the greatest subroutine depth, marking all the remaining samples as idle, and then dispatching all samples in the related group of divergent samples, including those marked as idle and those identified as having the greatest subroutine depth, through the pipeline for execution of the instruction accompanied by the codeword. After completion of the execution cycle, the state data related to the idle samples is popped from a storage stack, and the scoreboard is then consulted to determine which samples have the greatest subroutine depth at that point, after which the group of divergent samples with another code word is again passed through the pipeline.

With respect to the three references cited by the Examiner, Guttag teaches a complex processor capable of operating in both SIMD and MIMD modes. However, it is not capable of processing a group of related divergent graphic samples as claimed. As taught at column 13, lines 50-60 of Guttag, the same instruction is applied to a plurality of graphics processors. However, the cited sections of Guttag and the remainder of his patent do not teach that the instruction is applied to only selected samples of a group of

samples, while the remaining samples also pass through the pipeline. Guttag also does not teach that the samples are dispatched together with a token which designates what operation is to be applied to the selected samples as all of the samples in the group of samples pass through the pipeline.

The claims further recite when that the samples become non-divergent (claim 1) or after a pass though the pipeline (claims 9, 17, and 22), then the depth of each sample of the group is compared to all other sample depths of the group, and the samples within the group with the greatest depth are selected to be operated on. On the contrary, Guttag teaches (columns 15-16) if a branch in processing occurs, then a delay in further processing in the main pipeline will occur. In a further section cited by the Examiner, (column 89, lines 35-41) Guttag merely teaches that after an operation is complete, the result may be written to either one of two different registers, as designated by the program counter PC701. This does not provide, nor can it be suggested to provide, the sequence claimed herein, wherein with each iteration, certain samples are selected for processing based on subroutine depth while the remaining samples, even though they pass through the pipeline, are not subject to any processing until their subroutine depth matches the samples with the greatest subroutine depth.

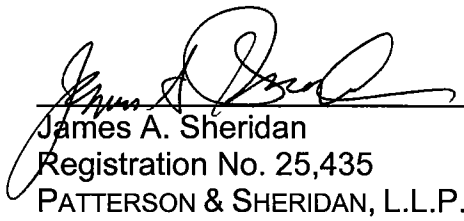
In addition to Guttag, the Examiner cites Lueh for teaching that state data associated with samples which are not to be executed is pushed onto a stack for later retrieval. This teaching of Lueh is inconsistent with the teachings of Guttag (column 89), which teaches that program flow is controlled by enabling the program counter 701 to designate one of two write addresses, depending on whether a subroutine call is to be executed at the completion of each instruction execution. There is no need in Guttag's construction to save global state data on a stack and then restore it. As taught at columns 15 and 16 of Guttag, a delay in operations (see Guttag column 16, lines 20-30) of the sequence is accepted, while necessary instructions are fetched, as opposed to the claimed continuous processing achieved by recycling selected samples within the pipeline disclosed in the present application.

The citation of Gosset does not remedy these deficiencies. In the first place, Gossett explicitly teaches at column 12, lines 28-33, that the system disclosed does not have any branching capability. Therefore, it is clear that Gossett cannot operate in a

way recited in the present claims where, for example as in claim 1, contain selected samples are processed using a particular instruction, while the remaining samples are not subject to execution of that instruction. Later, when the first sampled samples become non-divergent, then processing of all samples pursuant to the instructions, resumes. Reviewing all the teachings of Gossett, there is no teaching in Gossett that a token is dispatched with each pass of the group of related samples through the pipeline to control the execution of instructions on only selected samples of the group. Gossett, like the other references, fails to teach the claimed comparison of the subroutine depth of each sample to the subroutine depth of the other samples in the group to select one or more of the samples for processing while the remaining samples are designated as idle. In addition, no reference cited by the Examiner teaches the claimed maintenance of a scoreboard which is updated after each pass of the samples through the pipeline to determine which of the samples is to be the subject of the execution of an instruction on the next pass of the sample through the pipeline based on the depth of each sample.

In view of these clear distinctions between all the teachings of the references of record and the subject matter claimed herein, reconsideration and allowance of the claims is requested.

Respectfully submitted,



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